

THE PSEUDARBELIDAE, A NEW FAMILY OF PSYCHOID MOTHS, WITH DESCRIPTION OF A NEW SPECIES FROM NEW GUINEA

BY

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The rather large and diverse assemblage of moths informally called the "Micropsychina" is comprised of a number of groups of probable family rank which exhibit various stages of transition between the true Tineidae and the true Psychidae. These stages appear to represent a phyletic sequence dominated by a progressive degeneration or simplification of adult structures. The first such structures to be lost were the (*ipso facto*) special tineid traits: maxillary palpi, pecten of bristles on antennal scape and second palpal segment, ventral scaling on antennal shaft, and so on. Indeed, many of the true tineids show already a loss of one or another of these traits. The last structural simplifications, which distinguish the Psychidae s.s., involve various wing veins, the wings and ultimately other appendages of the female, and often much of the wing scaling of the male. At some indeterminate, but probably very early, stage in this sequence the sack-bearing habits of the larvae were acquired.

A relatively late member of this phyletic sequence is the family Melasinidae, an Old World group whose known members make underground tunnels and holes, clothed with silk, winged females, and complete (but very little specialized) heteroneurous venation. Especially characteristic of this family is the almost globular, compact form of the male genital capsule. This family is quite possibly the direct ancestral stock, or very near it, of the true Psychidae, and certain of its members (e.g., *Porthetes* West 1932, of the Philippines) are remarkably similar in their venation to some Psychidae.

The new family Pseudarbelidae which forms the subject of this paper apparently presents an early offshoot from the melasinids or from a melasinid-like ancestor. With the melasinids it shares the winged females, the complete heteroneurous venation and the elongated wings; it differs from them chiefly in the configuration of the fore wing anal veins, in the different structure of the male genitalia and in the much larger size.

Curiously, on the infrequent occasions when the members of this family have been referred to in the literature they have almost invariably been placed in the Cossidae (and once or twice as hepialids!). Even Professor ROEPKE, in his recent (1957) revision of the Malayan Cossidae, included them among the cossids, a fact which cheered me considerably, for on first examining *Pseudarbela* I had also thought them to be cossids, until I had seen the male genitalia. ROEPKE was not

able to study the male genitalia of any member of the group which he mentions, which no doubt accounts for his acceptance of them as Cossidae.

The unusual rarity in collections of the members of this family is probably also in some measure responsible for this erroneous reference to the cossids, as it is also for the general neglect of the group in the literature. There can hardly be any more than twenty specimens of the family in all the collections of the world; indeed, I have actual knowledge of only fifteen.

PSEUDARBELIDAE familia nova

Ocelli, chaetosema, maxillary palpi and proboscis all absent; antennae short, rather stout; simple, serrate or bipectinate; labial palpi stout, upturned nearly to top of eye. Fore wing with areole present; median stem forked in cell; 1A strongly obsolescent but when traceable, entering Cu₂ at the latter's middle; 3A enters 2A well beyond the middle of the latter, forming an enormous basal cell. Hind wing with cross-vein usually present from Rs just beyond cell-end to Sc; median stem forked in cell; three anal veins. Frenulum stout and long in the male; multiple, bristled but variable in development in the female.

Female winged, somewhat larger than the male.

Male genitalia (figs. 3, 4): lobes of uncus barely indicated or absent, not denticulate; processus inferior of valva short, without teeth, but with a sclerotized band supporting it along ventral edge of valva; saccus large but not especially long, not or only slightly digitate. Inner part of valva with a longitudinal spinose ridge and a basal process directed anteriorly and extending beyond the valva itself; and the two valvae are cross-connected.

Female genitalia (figs. 6, 7): ovipositor of the long piercing type, similar in most respects to other psychoids, the pseudapophyses of BRADLEY (1951, Entomologist, vol. 84, p. 181, fig. 2) well developed. The external opening is transverse, broad, mesial in position (rather than distal, as in the Arthenophanidae). It leads into a short, stout ostium bursae which in turn leads, into a small, nearly spherical sac. From this sac proceed two passages, but their nature and extent is unknown, for they are fragile and were destroyed in the dissection.

Remarks. This family is most closely related to the Melasinidae, from which it differs in the following characters: the stout upturned palpi; the long basal cell formed by fore wing veins 2A and 3A; absence of distinct, denticulate uncal lobes; the less prominent, not or only barely digitate saccus, the very short processus inferior of the valva, lacking distal teeth; the long strap-like support of the processus inferior; the long spinose ridge on the inner face of the valva.

All the genera and species known to me to belong to the Pseudarbelidae are enumerated below.

Pseudarbela Sauber 1902

Pseudarbela Sauber 1902, in Semper, Schmett. Philipp. Ins., part 2, p. 696 (Genotype: *Ps. semperi* Sauber 1902, l.c.; Arbelidae).

NEW SYNONYMY: *Parazeuzera* Bethune-Baker 1904, Novit. Zool., vol. 11, p. 384 (Genotype: *P. celaena* B.-B. 1904, l.c.; Cossidae); Dalla Torre 1923, Lepid. Cat. pars 29, p.

42 (Cossidae); Gaede 1933, in Seitz, Großschmett., vol. 10, p. 813 (Cossidae); Viette 1951, Lambillionea, vol. 51, p. 60 (Cossidae); Roepke 1957, Verh. Kon. Ned. Akad. Wet., Afd. Natuurk., ser. 2, vol. 52, p. 44 (Cossidae).

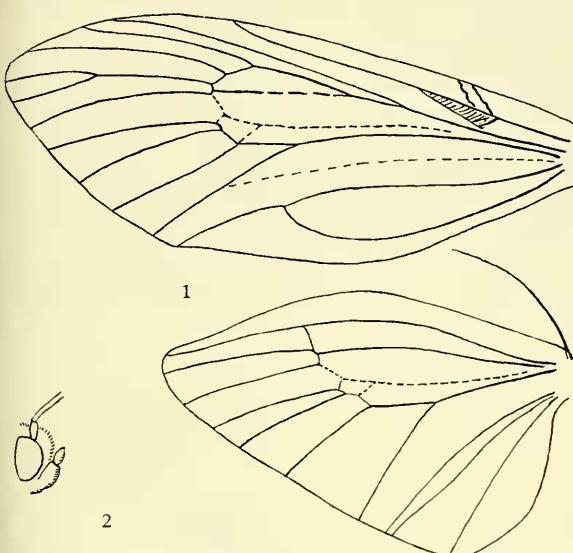


Fig. 1. *Pseudarbela semperi*, male; venation. 2. same; lateral view of head.

of eyes, third segment nearly equal to second in length; vestiture of palpi dense, suberect, apically compressed and broad enough so that each nearly touches its mate; maxillary palpi, chaetosema and proboscis absent; eye naked; antenna dorsally scaled in both sexes, ventrally uniserrate in males, the serrations finely ciliated; ventrally smooth in females, the ventral face rather flattened, with a feeble carina on either side of the flattened area; thorax densely covered with nearly erect spatulate scales, posteriorly gathered into a weak tuft; abdomen much exceeding hind wings (roughly twice as long as hind wing inner margin), with a small inconspicuous dorsal tuft proximally, an inconspicuous and very short anal tuft in males and prominent, expanded, bush-like tuft in females (in the latter, associated with a dorsal and a ventral densely pubescent, glandular-like area (fig. 5)).

Fore wing elongate, rounded. Venation as figured (fig. 1). Note the feeble adventitious cross-veins from Sc to costa on fore wing; feeble or absent 1A of fore wing; (in *Ps. papuana*, described below, though 1A is poorly developed, enough is present to show it distally entering Cu₂ and it is thus drawn in the figures;) the great extent of 3A, entering 2A at about $\frac{2}{3}$ the latter's extent from base to tornus; on the hind wing the cross-vein from Rs to Sc at or just beyond upper angle of the cell (absent in *Linggana*).

The hind tibia is longer than the hind femur and bears two pairs of spurs; a well developed arolium between the tarsal claws.

I have seen neither *celena* nor *aurea*, both of which BETHUNE-BAKER described from New Guinea as belonging to this genus; but the new species, *papuana*, described below, is close to *aurea* and agrees as well as can be expected with BETHUNE-BAKER's meagre and in places inaccurate description of the genus. There is, therefore, little doubt about the synonymy of *Parazeuzera* to *Pseudarbela*.

Generic description.
Frons and vertex with dense erect scales; palpi upturned to above middle

Pseudarbela semperi Sauber 1902

Pseudarbela semperi Sauber 1902, in Semper, Schmett. Philipp. Ins., part 2, p. 697, pl. 66, fig. 14 (♀ nec ♂).

There appears to have been no subsequent reference to this species (or to the genus) since SAUBER's original description.

SAUBER's description of the female omits a salient feature: the bluish green iridescence of the thorax, the hind wing and of the lighter (but not the darker!) parts of the fore wing above and of both wings below. This, in combination with the bright reddish anal tuft produces a striking effect, suggestive of the African agaristid *Massaga monteironis* Butler or the New Guinean noctuid, *Eucocytia meeki* Rothschild. Another trait not noticed by SAUBER is the presence of a small clear hyaline spot in the extreme base of the hind wing cell, visible just below the base of the fore wing inner margin.

The male of this species has never been described. Compared with the female it is a little smaller (length of fore wing 13.0—15.0 mm, compared with 17 mm in the single available female); abdomen without the red anal tuft, the scaling there being merely slightly longer, dark gray above, yellow below; abdomen ventrally yellow, crossed by black transverse segmental bands; thorax ventrally with pectus, fore and hind coxae yellow as the female. Fore wing above iridescent bronzy, with no trace of the blue-green iridescence of the female, but otherwise the markings are similar; hind wing quite different from that of the female, having a large central patch of yellow, repeated on the under surface where there is in addition a similar but duller and smaller patch on fore wing as well; otherwise the under surface is bronzy brown. Structural differences in the antennae are given in the generic description above.

SAUBER described the species from three females taken on Mindanao Id., Philippine Islands. I am indebted to Dr. E. L. TODD, of the United States National Museum, for a loan of two males and a female of this species for study, the latter being presented to the Carnegie Museum collection. These specimens, and three more females which I have not seen but whose data were kindly furnished by Dr. TODD, come from the following localities, all in the Philippines:

Luzon Id.: Mt. Makiling (leg. BAKER), 1 male. Sibuyan Id. (leg. BAKER): 1 female. Masbate Id.: Aroroy, VIII.1912, 1 female. Mindanao Id.: Monuangon, II (don. B. P. CLARK), 1 male; Surigao (leg. BAKER), 2 females.

Pseudarbela celaena (Bethune-Baker 1904) combin. nov.

Parazeuzera celaena Bethune-Baker 1904, Novit. Zool., vol. 11, p. 384, pl. 5, fig. 9; Dalla Torre 1923, Lepid. Cat., pars 29, p. 48; Gaede 1933, in Seitz, Großschmett., vol. 10, p. 823, pl. 96d; Roepke 1957, Verh. Kon. Akad. Wet., Afd. Natuurk., ser. 2, vol. 52, p. 44, pl. 1, fig. 9.

Both sexes dark smoky gray, marked with darker spots. The female (ROEPKE, l.c.) has a yellow anal tuft.

Described from a single male from Dinawa, north of the Angabunga River, British New Guinea. ROEPKE (l.c.) describes and figures a female from Batjan in the collection of the Paris Museum.

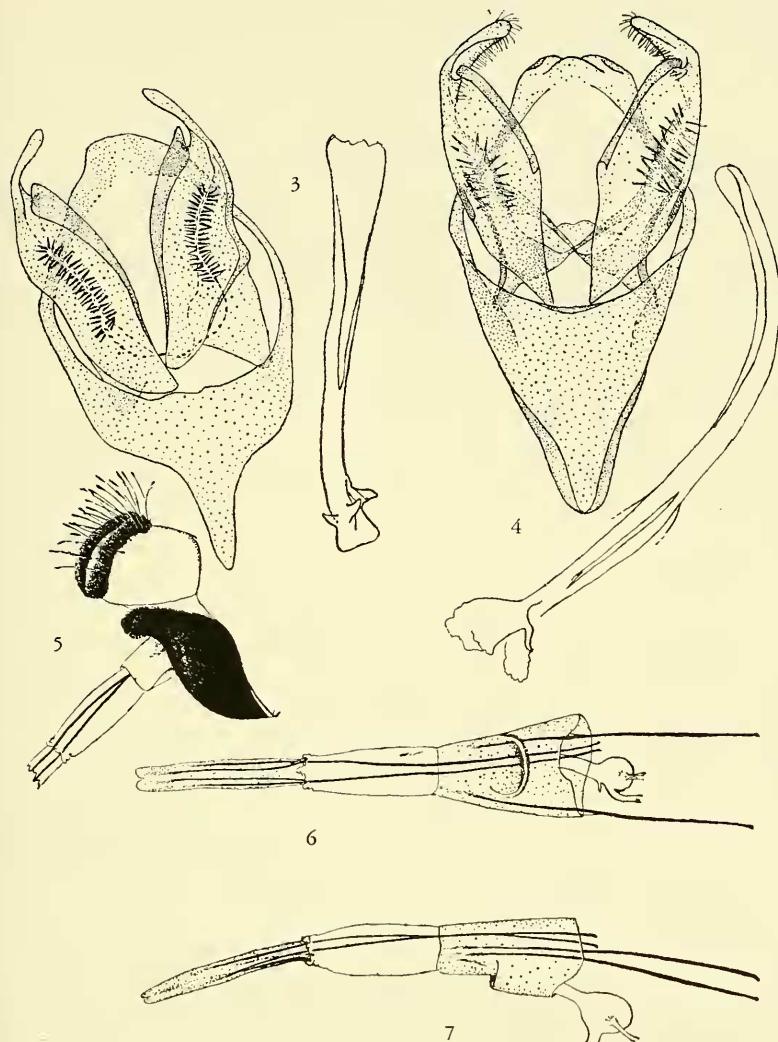


Fig. 3. *Pseudarbelia semperi*; male genitalia in ventral view; penis to right. 4. *Pseudarbelia papuan* spec. nov.; male genitalia of holotype in ventral view; penis to right. 5. *Pseudarbelia semperi*, female; lateral view of end of abdomen to show dorsal and ventral glandular patches; only a few of the much longer scales of the anal tuft are shown, and the ovipositor is cut off. 6. Same; ovipositor in ventral view. 7. Same; ovipositor in lateral view.

***Pseudarbelia aurea* (Bethune-Baker 1904) combin. nov.**

Parazeuzera aurea Bethune-Baker 1904, Novit. Zool., vol. 11, p. 384, pl. 5, fig. 10; Dalla Torre 1923, Lep. Cat., pars 29, p. 48; Gaede 1933, in Seitz, Großschmett., vol. 10, p. 823, pl. 96d.

Both wings a golden fulvous color; see comparison in remarks under the next species, which is very similar.

Likewise described from Dinawa and apparently known from but a single specimen.

Pseudarbela papuana spec. nov.

Male. Agrees fully with the generic description given above (based chiefly on *semperi*), differing from the genotype only in the following points: palpi a little less compressed apically; posterior tuft of thorax slightly stronger; wings rather less elongate. Fore wing: the chorda (vein between areole and cell) possibly a little fainter; Cu₁ closer to M₃ than is M₂, and very remote from Cu₂; 1A present proximally as a tubular vein, becoming evanescent distally and apparently running into Cu₂ at about middle of the latter. Hind wing: lower branch of median stem runs to base of M₃ rather than to between M₃ and Cu₁.

Frons, vertex, palpi, tegulae, thorax above and below, legs and abdomen above and below: all golden fulvous; palpi and frons laterally with some dark, almost black, scaling; thorax below partly a little paler; thorax above with some slightly darker tufting.

Upperside. Fore wing: golden fulvous with a reticulate pattern of fine dark brown shining lines or striae, gathered into a dark spot in the cell near its end, a series of partly confluent spots along costa (though the costa itself is narrowly golden fulvous almost without interruption throughout), a mottled patch at apex and a postmedian incomplete series of rather small internervural dots; a series of vague darker spots between veins on termen, at least in M₃—Cu₁; terminal area shaded with greyish. Fringe golden fulvous, darkening to golden brown costad. Hind wing: pale, translucent gray-brown, paler costad at base. Fringe golden fulvous.

Underside. Fore wing: golden fulvous overshaded with grayish, most heavily near tornus below M₁; not at all along costa and at apex. Fringe golden fulvous. Hind wing: as upperside.

Length of fore wing: 14.5 mm.

Holotype, male, War, Tami River, vicinity of Hollandia, Dutch New Guinea, 10.III.1937 (W. STÜBER). Carnegie Museum, Entomology, type series no. 240.

Remarks. The bright golden fulvous color of both wings and of body will separate this species immediately from all but *aurea*. It is apparently very close to this latter, differing in its significantly smaller size (ca. 30 mm expanse, as compared with about 40 mm for *aurea*), and the fore wings are much more heavily marked with brown. In *aurea* the wings are nearly unspotted.

Linggana Roepke 1957

Linggana Roepke 1957, Verh. Kon. Ned. Akad. Wet., Afd. Natuurk., ser. 2, vol. 52, p.43. (Genotype: *L. cardinali* Roepke, l.c.; Cossidae).

It is possible that this genus may fall to *Pseudarbela*. Certainly the single female of *cardinali* which ROEPKE describes agrees rather closely in most details with females of *semperi*. Of the characters of possible generic significance which ROEPKE mentions, the absence of the Sc-Rs cross-vein on the hind wing and the strong multiple-bristled frenulum are perhaps the most suggestive, for in every

Pseudarbelia I have seen (2 males, 2 females; representing 2 species) this cross-vein is present; and in the single available female of *semperi* the frenulum, though multiple-bristled, is weak and possibly functionless, though very well developed in the males.

Linggana cardinaali Roepke 1957

Linggana cardinaali Roepke 1957, op. cit., p. 44, pl. 3, fig. 5.

Professor ROEPKE has described this species from a female taken on Singkep, in the Lingga Archipelago, south of Singapore and less than 50 km from the eastern coast of Sumatra. The description and figure represent an insect apparently quite similar to the female of *Pseudarbelia semperi*, differing from it in the very indistinct spotting or reticulation of the upper surface of the fore wing, and in the concolorous pectus ("inner side of femora" of ROEPKE, if I understand him correctly) and terminal abdominal tuft, both of which he describes as bright orange. In female *semperi* the fore wing above is prominently fuscous spotted or reticulate, while the bright rose abdominal tuft contrasts markedly with the bright yellow pectus.

Casana Walker 1865

Casana Walker 1865, List Lep. Het. Br. Mus., vol. 32, p. 591 (Genotype: *C. trochilooides* Walker l.c.; Zeuzeridae); Kirby 1892, Syn. Cat. Lep. Het., vol. 1, p. 873 (Zeuzeridae); Swinhoe 1892, Cat. East. Or. Lep. Het. Oxford, vol. 1, p. 287, pl. 8, fig. 10 (as *trichilooides* in text, *trilichooides* on plate; Hepialidae); Wagner & Pfitzner 1911, Lep. Cat. pars 4, p. 22 (Hepialidae); Dalla Torre 1923, Lep. Cat. pars 29, p. 48 (Cossidae); Gaede 1933, in Seitz, Großschmett., vol. 10, p. 823 (refers it with doubt to Cossidae); ibid., op. cit., p. 845 (refers it with doubt to Hepialidae, but considers Cossidae more likely); Viette 1951, Lambillionea, p. 51, p. 39 (Cossidae).

This genus is based on the single species *trochilooides*, and our knowledge of it is confined to WALKER's brief description and the figure in SWINHOE. It is from this latter that its relationship to *Pseudarbelia* is at once apparent, for the figure shows an insect not only similar in facies — long abdomen, long slender wings and so on — but the fore wing venation is sketched in enough detail to show strong agreement with *Pseudarbelia*, especially in the very large 2A—3A basal cell, so characteristic of this family.

From the terminal abdominal tuft described by WALKER and well shown in SWINHOE's figure I assume that the specimen is a female. The antennae are described and figured as pectinate, a character which should serve to distinguish *Casana* from either *Pseudarbelia* or *Linggana*.

Casana *trochilooides* Walker 1865

Casana trochilooides Walker 1865, l.c.; Kirby 1892, l.c.; Swinhoe 1892, l.c.; Wagner & Pfitzner 1911, l.c.; Dalla Torre 1923, l.c.; Gaede 1933, l.c.

WALKER's description was based on a single specimen taken in the Aru Ids., apparently by WALLACE. So far as I am aware, no additional specimens of the species have been taken since.